

We claim:

- 1 1. A central laundry processing system comprising:
2 at least one wash vessel;
3 at least one detergent initially disposed in the at least one wash vessel; and
4 at least one wash loop wherein the at least one wash loop comprises:
5 at least one wash effluent vessel in fluid communication with the at
6 least one wash vessel;
7 at least one wash filter in fluid communication with the at least one
8 wash effluent vessel; and
9 at least one wash permeate vessel in fluid communication with the at
10 least one wash filter and the at least one wash vessel.
- 1 2. The system of Claim 1 further comprising at least one wash retentate loop
2 between the at least one wash filter and the at least one wash effluent vessel.
- 1 3. The system of Claim 1 further comprising at least one rinse loop wherein the
2 rinse loop comprises at least one rinse effluent vessel in fluid communication with the
3 at least one wash vessel.
- 1 4. The system of Claim 2 further comprising at least one rinse loop wherein the
2 rinse loop comprises at least one rinse effluent vessel in fluid communication with the
3 at least one wash vessel.
- 1 5. The system of Claim 3 wherein the rinse loop further comprises:
2 at least one rinse filter in fluid communication with the rinse effluent vessel;
3 and
4 at least one rinse permeate vessel in fluid communication with the at least one
5 rinse filter and the at least one wash vessel.

- 1 6. The system of Claim 5 further comprising at least one wash retentate loop
2 between the at least one wash filter and the at least one wash effluent vessel.
- 1 7. The system of Claim 5 further comprising at least one rinse retentate loop
2 between the at least one rinse filter and the at least one rinse effluent vessel.
- 1 8. The system of Claim 7 further comprising at least one wash retentate loop
2 between the at least one wash filter and the at least one wash effluent vessel.
- 1 9. The system of Claim 3 further comprising a conduit disposed in fluid
2 communication with the at least one rinse effluent vessel and the at least one wash
3 effluent vessel wherein the conduit is capable of transferring fluid from the at least
4 one rinse effluent vessel to the at least one wash effluent vessel.
- 1 10. The system of Claim 7 further comprising a conduit disposed in fluid
2 communication with the at least one rinse effluent vessel and the at least one wash
3 effluent vessel wherein the conduit is capable of transferring fluid from the at least
4 one rinse effluent vessel to the at least one wash effluent vessel.
- 1 11. The system of Claim 8 further comprising at least one additional loop capable
2 of providing greater water and chemical recovery.
- 1 12. The system of Claim 1 wherein each wash filter has a filter size in a range of
2 about .005 microns to about 5 microns.
- 1 13. The system of Claim 1 wherein each wash filter has a filter size in a range of
2 about .01 microns to about 0.2 microns.
- 1 14. The system of Claim 5 wherein each wash filter and each rinse filter has a
2 filter size in a range of about .005 microns to about 5 microns.

- 1 15. The system of Claim 5 wherein each wash filter and each rinse filter has a
2 filter size in a range of about .01 microns to about 0.2 microns.
- 1 16. The system of Claim 1 wherein each wash filter comprises a fluoropolymer, a
2 polyacrylonitrile, a ceramic, a polyethylene terephthalate, a polyvinylidene fluoride,
3 cellulose, cellulose acetate, or a polypropylene.
- 1 17. The system of Claim 1 wherein each wash filter comprises polyacrylonitrile.
- 1 18. The system of Claim 5 wherein each wash filter and each rinse filter
2 comprises a fluoropolymer, a polyacrylonitrile, a ceramic, a polyethylene
3 terephthalate, a polyvinylidene fluoride, cellulose, cellulose acetate, or a
4 polypropylene.
- 1 19. The system of Claim 5 wherein each wash filter and each rinse filter
2 comprises polyacrylonitrile.
- 1 20. The system of Claim 1 wherein each wash filter is a crossflow filter.
- 1 21. The system of Claim 1 wherein each wash filter is a vibratory-enhanced filter.
- 1 22. The system of Claim 5 wherein each wash filter and each rinse filter is a
2 crossflow filter.
- 1 23. The system of Claim 5 wherein each wash filter and each rinse filter is a
2 vibratory-enhanced filter.
- 1 24. The system of Claim 1 wherein each wash vessel is a household top-load
2 machine, household front-load machine, or an industrial front-load machine.
- 1 25. The system of Claim 1 wherein each wash vessel is an industrial front-load
2 washing machine.

- 1 26. The system of claim 1 wherein the detergent is a powder.
- 1 27. The system of claim 1 wherein the detergent is a liquid.
- 1 28. The system of claim 1 wherein the detergent comprises surfactants.
- 1 29. The system of claim 1 wherein the detergent comprises anionic surfactants,
2 nonionic surfactants, cationic surfactants, phosphate surfactants, or amphoteric
3 surfactants.
- 1 30. The system of claim 1 wherein the detergent comprises builders.
- 1 31. The system of claim 1 wherein the detergent comprises sodium carbonate,
2 zeolite, or soda ash.
- 1 32. The system of claim 1 wherein the detergent comprises fluorescent whitening
2 agents.
- 1 33. The system of claim 1 wherein the detergent comprises enzymes.
- 1 34. The system of claim 1 wherein the detergent comprises polyvinyl pyrrolidone,
2 carboxymethylcellulose, or polyacrylate.
- 1 35. The system of claim 1 wherein the detergent comprises perfumes.
- 1 36. The system of claim 1 wherein the detergent comprises bleach.
- 1 37. The system of claim 1 wherein the detergent comprises chlorine or peroxygen.
- 1 38. The system of claim 1 wherein the detergent comprises defoamer.
- 1 39. The system of claim 1 wherein the detergent comprises soap or silicon oil.

- 1 40. The system of claim 1 wherein the detergent comprises liquid detergent with
2 chlorine bleach, nonionic surfactants, silicone defoamers, and no zeolite.
- 1 41. The system of claim 1 wherein the wash loop has a temperature of between
2 about 10°C and about 90°C.
- 1 42. The system of claim 1 wherein the wash loop has a temperature of about 40°C.
- 1 43. The system of claim 3 wherein the rinse loop has a temperature of between
2 about 10°C and about 90°C.
- 1 44. The system of claim 3 wherein the rinse loop has a temperature of about 25°C.
- 1 45. The system of claim 1 wherein each wash filter has a temperature of between
2 about 10°C and about 90°C.
- 1 46. The system of claim 5 wherein each wash filter and each rinse filter has a
2 temperature of between about 10°C and about 90°C.
- 1 47. The system of claim 1 wherein each wash filter has a temperature of about
2 30°C.
- 1 48. The system of claim 5 wherein each wash filter and each rinse filter has a
2 temperature of about 30°C.
- 1 49. The system of claim 1 wherein wash loop has a recycle ratio of between about
2 30% and about 90%.
- 1 50. The system of claim 7 wherein rinse loop has a recycle ratio of between about
2 30% and about 90%.

1 51. The system of claim 1 wherein wash loop has a recycle ratio of between about
2 30% and about 90%.

1 52. The system of claim 7 wherein rinse loop has a recycle ratio of between about
2 30% and about 90%.

1 53. A method of processing laundry which comprises the steps of:
2 (a) washing a first load of laundry with a detergent in at least one wash
3 vessel to produce a first clean load of laundry and a first wash effluent;
4 (b) passing the first wash effluent through at least one wash filter,
5 producing a first wash permeate and a first wash retentate; and
6 (c) rinsing the first clean load of laundry to produce a first rinsed load of
7 laundry and a first rinse effluent.

1 54. The method of Claim 53 which further comprises the steps of:
2 (d) washing a second load of laundry using in part at least a portion of the
3 first wash permeate in the at least one wash vessel to produce a second
4 clean load of laundry and a second wash effluent;
5 (e) passing the second wash effluent through the at least one wash filter,
6 producing a second wash permeate and a second wash retentate; and
7 (f) rinsing the second clean load of laundry to produce a second rinsed
8 load of laundry and a second rinse effluent.

1 55. The method of claim 53 which further comprises the step of:
2 (d) passing at least a portion of the first rinse effluent through at least one
3 rinse filter to produce a first rinse permeate and a first rinse retentate.

1 56. The method of claim 54 which further comprises the step of:
2 (g) passing at least a portion of the second rinse effluent through the at
3 least one rinse filter to produce a second rinse permeate and a second
4 rinse retentate.

1 57. The method of Claim 54 wherein Step (f) is accomplished in part by using at
2 least a portion of the first rinse permeate.

1 58. The method of Claim 53 which further comprises the steps of:

- 2 (d) passing the first rinse effluent through at least one rinse filter,
3 producing a first rinse permeate and a first rinse retentate;
- 4 (e) washing a second load of laundry with the detergent and in part at least
5 a portion of the first wash permeate in the at least one wash vessel to
6 produce a second clean load of laundry and a second wash effluent;
- 7 (f) passing the second wash effluent through the at least one wash filter,
8 producing a second wash permeate and a second wash retentate;
- 9 (g) rinsing the second clean load of laundry with in part at least a portion
10 of the first rinse permeate to produce a second rinsed load of laundry
11 and a second rinse effluent; and
- 12 (h) passing the second rinse effluent through the at least one rinse filter to
13 produce a second rinse permeate and a second rinse retentate.

1 59. The method of Claim 54 wherein between about 30% and about 90% of the
2 washing in Step (d) is accomplished with first wash permeate.

1 60. The method of Claim 57 wherein between about 30% and about 90% of the
2 rinsing in Step (f) is accomplished with first rinse permeate.

1 61. The method of Claim 58 wherein between about 30% and about 90% of the
2 washing in Step (e) is accomplished with first wash permeate and between about 30%
3 and about 90% of the rinsing in Step (g) is accomplished with first rinse permeate.

1 62. The method of Claim 55 which further comprises the step of:

- 2 (e) transferring at least a portion of the first rinse retentate to the first wash
3 effluent.

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- 1 63. The method of Claim 56 which further comprises the step of:
2 (h) transferring at least a portion of the second rinse retentate to the second
3 wash effluent.

- 1 64. The method of Claim 53 which further comprises the step of repeating Steps
2 (e)-(h) at least once on additional loads of laundry.

- 1 65. The method of Claim 64 wherein up to about nine loads of laundry are
2 processed.

- 1 66. The method of Claim 53 wherein the method is steady state.

- 1 67. The method of Claim 64 wherein the method is steady state.

- 1 68. The method of Claim 53 which further comprises the steps of:
2 (d) passing a previous rinse effluent through at least one rinse filter,
3 producing a previous rinse permeate and a previous rinse retentate;
4 (e) washing a subsequent load of laundry with the detergent and in part at
5 least a portion of a previous wash permeate in the at least one wash
6 vessel to produce a subsequent clean load of laundry and a subsequent
7 wash effluent;
8 (f) passing the subsequent wash effluent through the at least one wash
9 filter, producing a subsequent wash permeate and a subsequent wash
10 retentate; and
11 (g) rinsing the subsequent clean load of laundry with in part at least a
12 portion of the previous rinse permeate to produce a subsequent rinsed
13 load of laundry and a subsequent rinse effluent;
14 (h) repeating Steps (d)-(g) at least once;
15 wherein the previous rinse effluent is the second rinse effluent prior to Step (h)
16 and the previous wash permeate is the first wash permeate prior to Step (h).

- 1 69. The method of Claim 66 wherein up to about nine loads of laundry are
2 processed.
- 1 70. The method of Claim 68 wherein the method is steady state.